The TONKIN PATENT WATER TUBE BOILERS

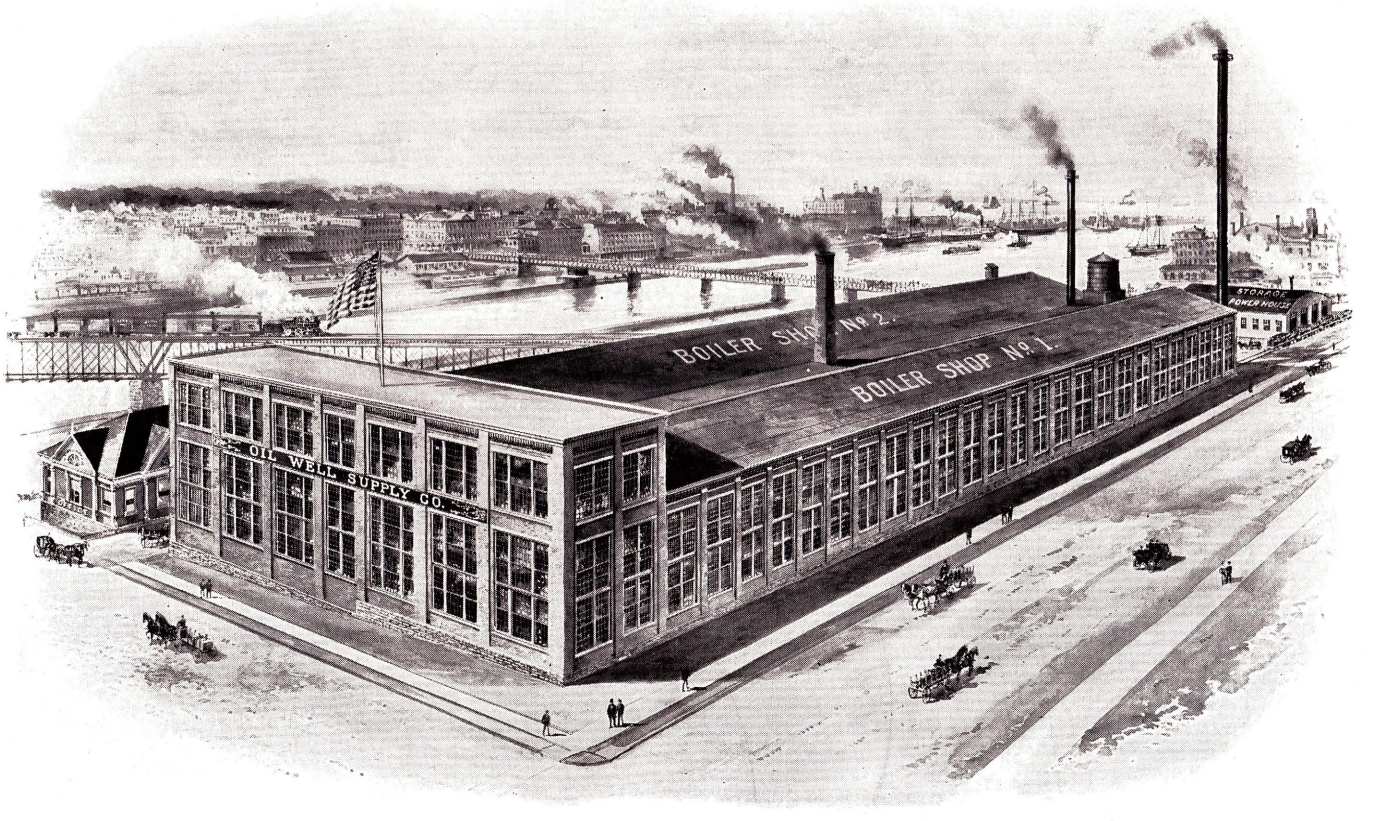
The TONKIN PATENT
INTERNALLY-FIRED
WATER TUBE BOILERS

Manufactured by the

OIL WELL SUPPLY COMPANY

PITTSBURGH, PA., U.S.A.

Boiler Works Dept., *OSWEGO, N.Y.*



BOILER WORKS AT OSWEGO, N. Y.

The New Boiler Works at Oswego, New York

THE plant covers nearly four acres. The boiler shop is 413 feet long by 125 feet wide. There are two 30-ton electric cranes running the entire length of the shop. The works are thoroughly equipped throughout with new machinery of the latest and most improved type, including hydraulic riveters and a hydraulic flanging press, 9 feet in diameter, capable of flanging, at one heat, heads 96 inches in diameter.

The plant is operated by water power (from the Oswego River). Steam, electricity, compressed air and hydraulic powers are also used.

Railroad tracks run into the shop. All railroads centering at Oswego enter the property. All of the buildings are new and are especially adapted for the purpose.

Oswego is an ideal location for a boiler manufacturing plant. It has excellent railroad facilities. The water-power privilege owned by the company saves each year several thousand dollars over what steam would cost.

Oswego is cool in summer, and is an attractive and inexpensive place in which to live. It is easy to obtain skilled labor, and many of the workingmen own their homes.

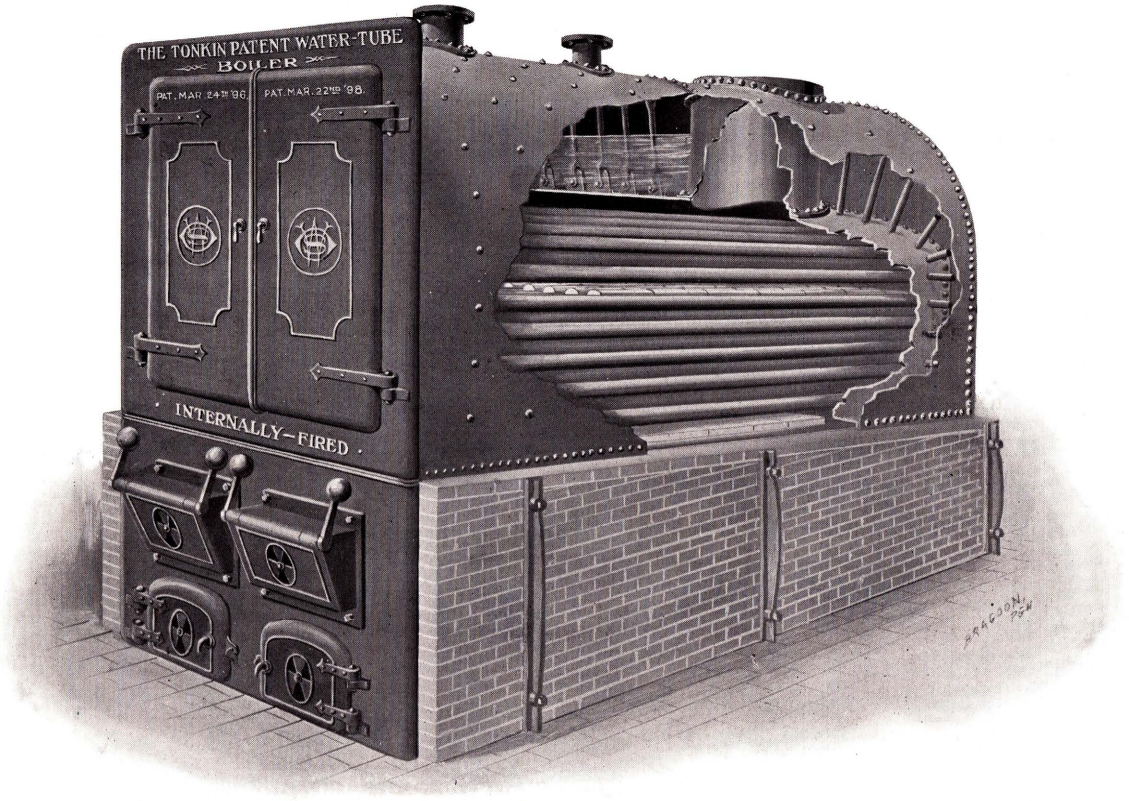


FIG. 1

CLASS A BOILER—See description, pages 8 to 12

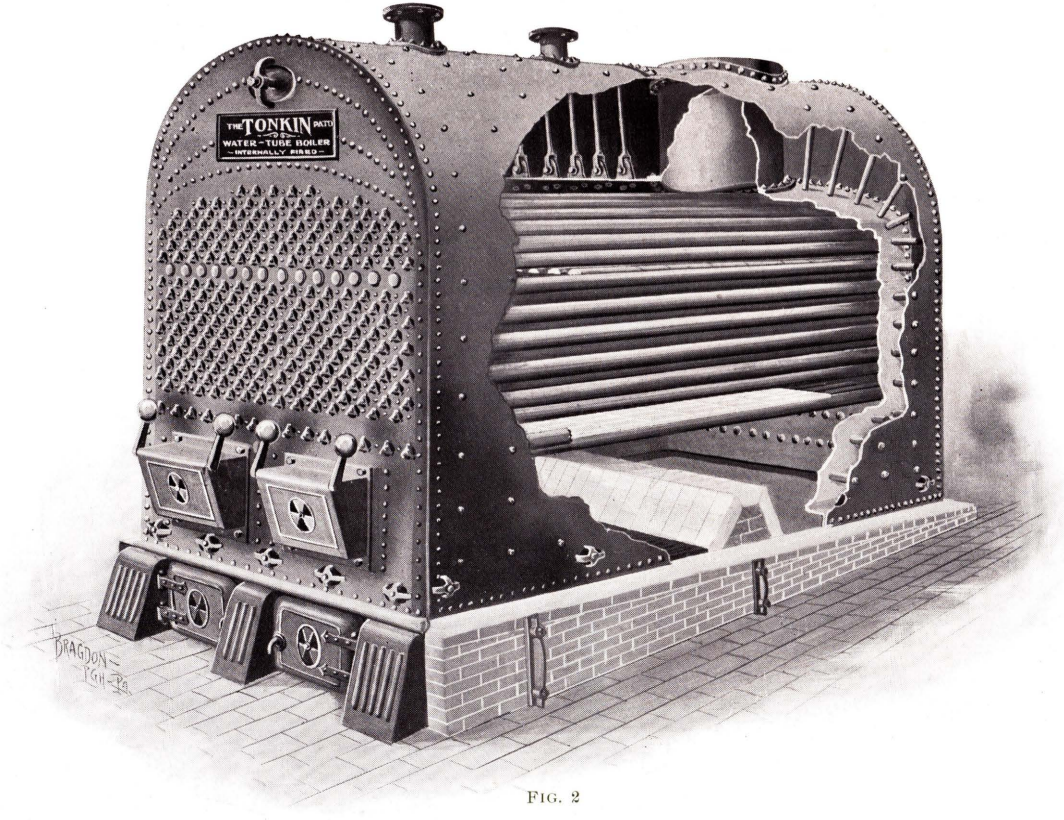


FIG. 2

CLASS B BOILER — See description, pages 8 to 12

Description of the Tonkin Patent Internally-Fired Water Tube Boilers

They are made in two styles, designated as "Class A" (see Fig. 1, page 6) and "Class B" (see Fig. 2, page 7.) Class A boilers are not as high as Class B (consequently, more easily handled.) The sides, or legs, of Class B boilers are 23 inches longer than those of Class A. The sides, or legs, in Class A boilers extend 7 inches below the lower tubes; in Class B boilers, 30 inches below.

In Class A boilers, the fire doors are in the brick setting below the boiler. In Class B, the fire doors are in the boiler.

Both styles are the same height, when set on foundation, Class A boilers requiring a higher foundation, and, consequently, more brick than Class B boilers.

The foundations for both styles are easily and cheaply constructed; the foundation for Class B boilers being less expensive than for Class A.

Blue prints and working drawings for foundation and setting are furnished with each boiler. Any bricklayer of ordinary skill can readily do the work.

The boilers are supported by four heavy cast iron legs (one under each corner); those at the front are rigid, while those at the rear are movable, allowing for contraction and expansion.

As the boiler rests entirely on the supports, all liability of the foundation's cracking, or breaking from the heavy weight is avoided. The brick work can be removed without disturbing the boiler.

The boilers are made with an inner and outer shell, between which is the water and steam space. Straight tubes are connected to each end of the inner shell. Through the tubes, and between the two shells, the water circulates. In Class B boilers the fire is confined and surrounded by water, and the entire heat energy is utilized.

The boilers are set on an incline of 1 inch to the foot (the front being the highest) and rapid and constant circulation of water through the tubes is thus insured.

All sediment is swept along by the flow of water and dropped near the blow-off cock. An occasional blow-off removes all deposits. By reason of this, foul water, too foul for ordinary boilers, can be used.

A boiler which had been in constant use for fourteen months was recently opened for thorough inspection, and only a handful of sediment was found.

Through the manhole in the front head all parts of the boiler can be readily examined.

There is a handhole opposite each tube, at each end of the boiler, through which the tube can be examined, expanded, or replaced.

The large diaphragm tube sheets expand and contract so uniformly with the tubes that leaky tube ends are unknown.

The boilers are made of the best of steel, in the most secure manner, and by first-class workmen.

The boilers are under constant inspection during the process of manufacture, being tested five times by steam and hydrostatic pressures (twice before the tubes are put in, and three times afterward.)

Two rows of baffle fire brick (the first between the lower tubes, and the second at a proper distance above) cause the flame and gases to pass three times the length of the boiler before reaching the stack, thus securing the best possible results from the fuel. The baffle brick are easily taken out and replaced through the openings for the purpose at each end of the boiler.

The crown sheet is at the highest part, and as the flames travel twice the length of the boiler before reaching the crown sheet, it is impossible to burn it, even when the water is low.

The bridge wall is located to suit the length of the grates, which can be readily adapted to burn coal, natural gas, oil, wood, bagasse or any other fuel.

Shaking grates are furnished when required. They are operated from the outside of the boiler, and the fire is kept clear and bright without the admission of cold air, as the door is opened only to supply fuel.

Automatic stokers can be attached when desired.

The stay bolts connecting the ends, between the tubes and all other stay bolts, are hollow.

A steam flue cleaner can be readily inserted through the stay bolts, and the tubes effectually cleaned as often as desired. The steam coming in contact with the heated parts becomes superheated, and not only thoroughly cleans the tubes and blows the soot out through the stack, but also improves the draft. No cold air is admitted during the process of cleaning, the operation of the boiler is not checked, but instead is accelerated.

The water area is spacious, and there is ample storage room for steam.

The liberating surface at the front is very large.

The water legs at the front and rear extend the full width of the boiler, the distance between the inner and outer shells at each end being the same.

A dry pipe, or separator, is placed inside of the boiler, under the safety valve and steam valve outlets, thus preventing water from being carried over, insuring dry steam.

Boiler covering of the best non-heat conducting material to prevent radiation is furnished with each boiler. It is made to fit and is readily put on. When the boiler is covered, practically no heat is lost.

Very promptly after receipt of boiler it can be set, covered, connected to steam pipes and ready for fuel and fire.

The boilers make steam quickly and steadily. Repeated tests have proven them to be very economical.

The heads of the boilers are flanged while hot, at one operation, from single sheets, by a hydraulic press, after which they are annealed. They will resist any strain to which they may be subjected.

The boilers are compact, self-contained and suitable for any stationary purpose. They are especially adapted for places where space is limited.

For marine purposes, the boilers are furnished either with a water bottom, or with a suitable pan of steel or iron.

Every part of the boiler is easily accessible for examination.

The boilers are easily and cheaply repaired, but repairs are seldom necessary.

Unless otherwise specified, the boilers are built for a working pressure of 125 pounds per square inch, with a factor of safety of five. They can be made for any required pressure.

Though the boilers can be safely forced beyond their rated capacity, yet it is earnestly recommended that they never should be.

Ten square feet of heating surface are rated as one horse-power.

The boilers are braced according to United States Government requirements.

The boilers will answer every requirement and will pass every inspection of United States, State or municipal authorities and insurance companies.

If required, a portable stack to rest on the boiler (which is amply strong to sustain the weight) will be furnished.

Smoke stacks and connections are extra and built according to specifications.

The Following are Furnished with Each Boiler

Improved shaking grates, or plain grates to suit fuel to be used.*

One water column, with three gauge cocks and glass water gauge.

One safety valve (screw or flanged, ball or pop) with nipple.

One steam gauge (brass), 8-inch dial.

One steam gauge syphon.

One steam gauge cock (male and female).

One blow-off cock (asbestos packed).

One globe valve for feed.

One check valve for feed.

Nipples for all screwed valves and cocks.

One steam tube cleaner without hose.

Non-heat conducting covering.

Stack and firing tools are not included in above.

Sizes of Cocks and Valves Furnished with Boilers

Horse-power of boiler	100	150	200	250	300
Blow-off cock, inch	2	2	2½	2½	3
Feed valve, inch	1½	1½	2	2	2½
Check valve, inch	1½	1½	2	2	2½
Safety valve, ball, inch	4	5	6	6	7
Safety valve, pop, inch	3½	4	4½	5	6

*NOTE.—In ordering, please state kind of fuel intended to be used.

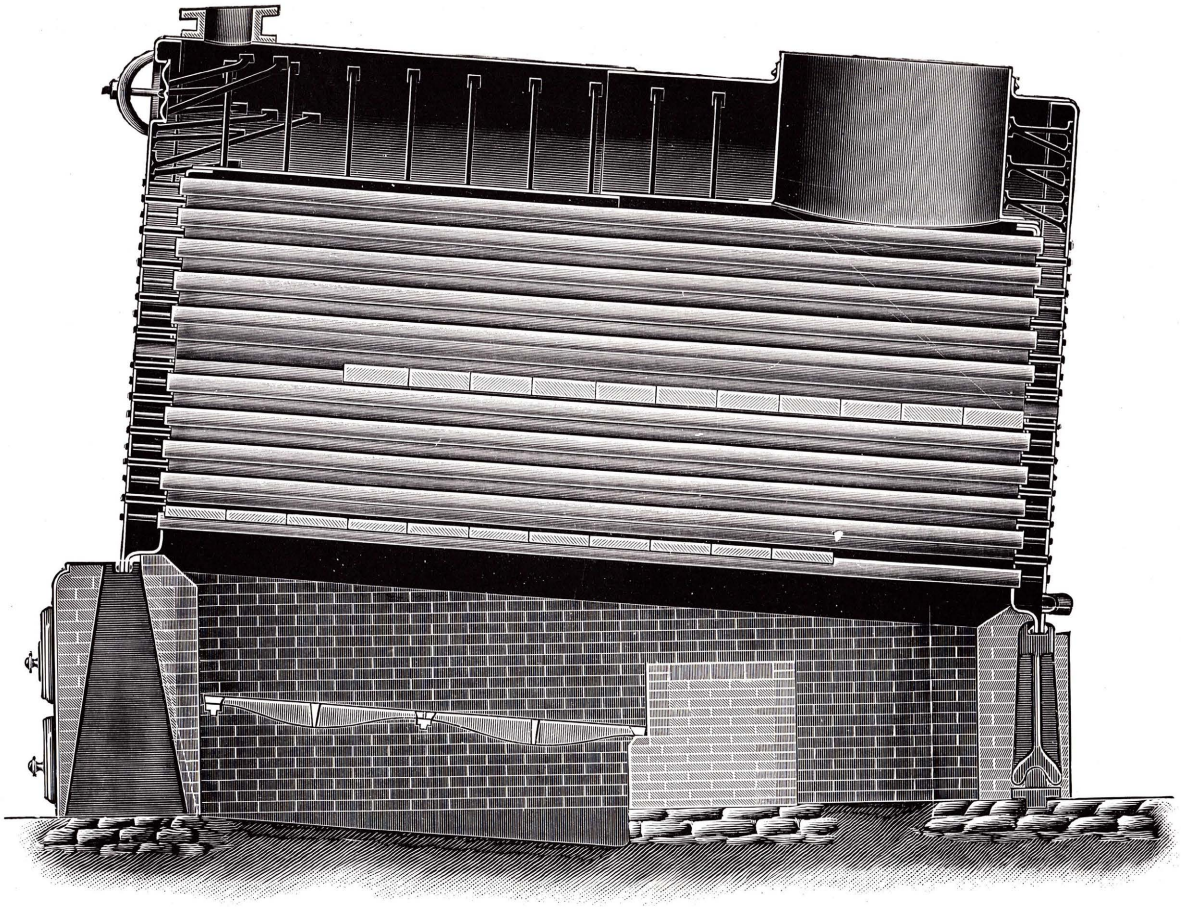


FIG. 5

SECTIONAL VIEW OF CLASS A BOILER

Showing baffle firebrick partitions, supporting columns and improved plan of caring for the expansion. Notice that boiler does not rest upon the walls.

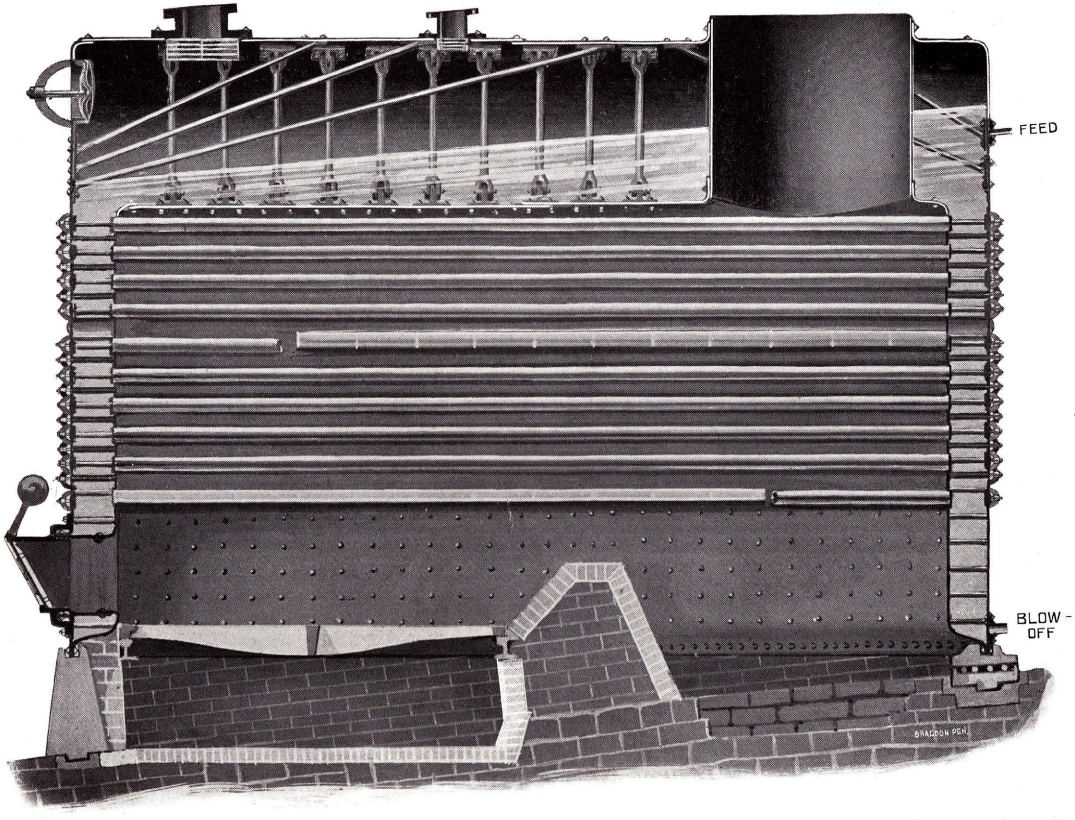


FIG. 6

SECTIONAL VIEW OF CLASS B BOILER

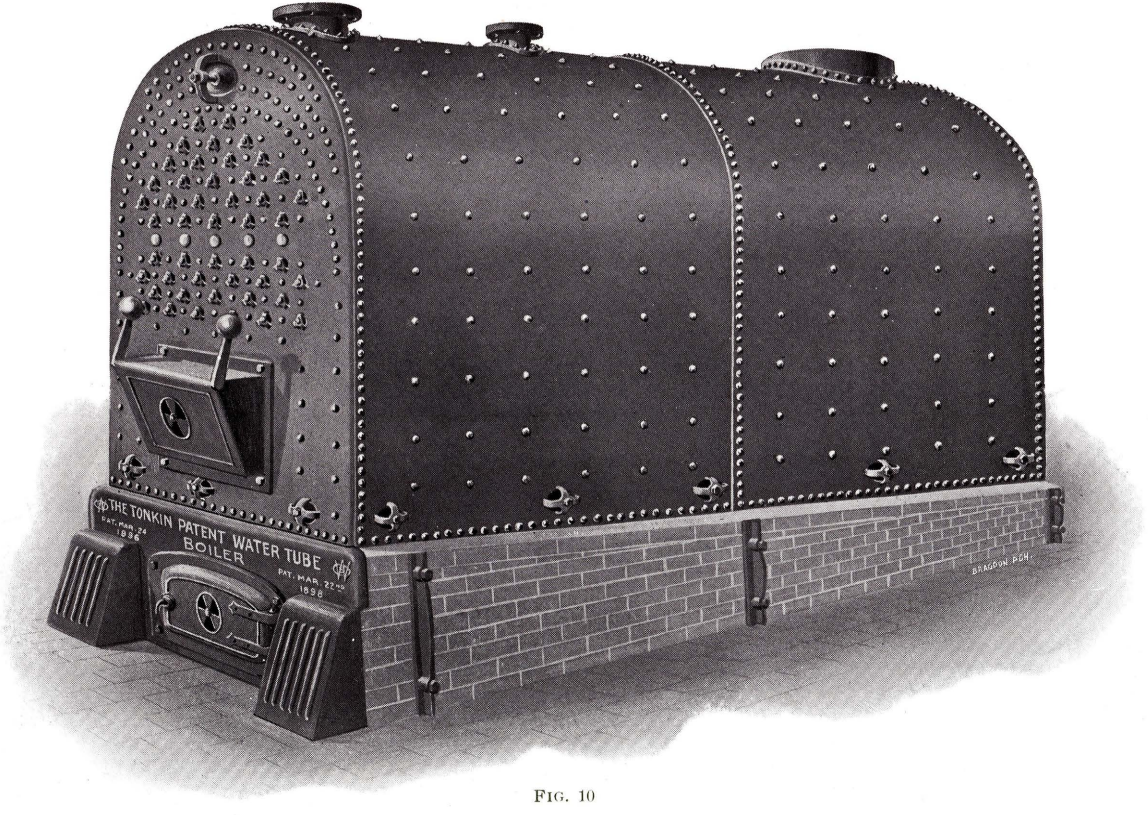


FIG. 10

CLASS B BOILER ON FOUNDATION

Ready to be connected.

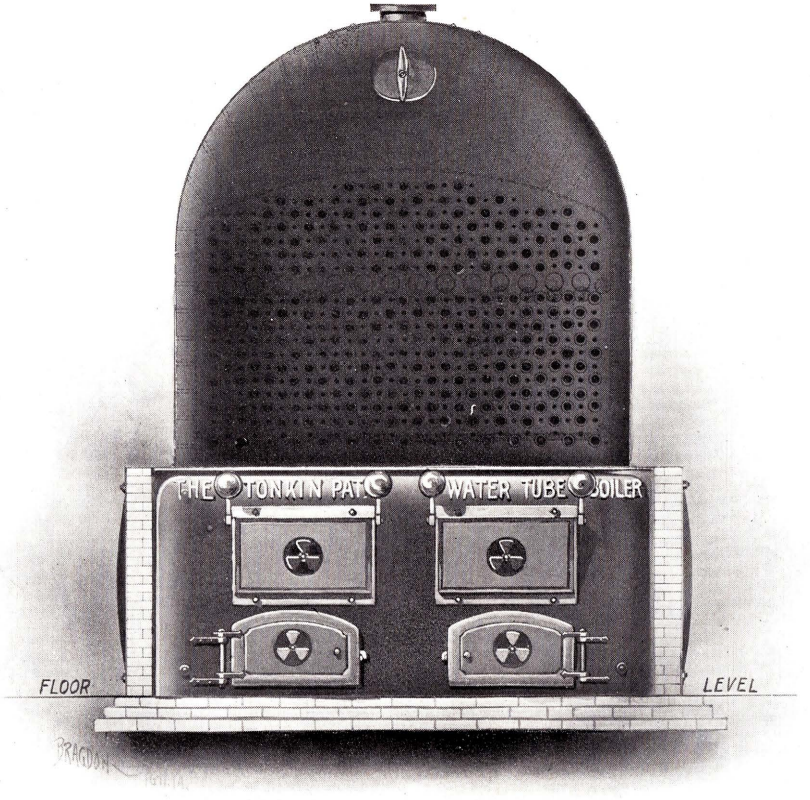


FIG. 15

FRONT VIEW CLASS A BOILER

Set on foundation.

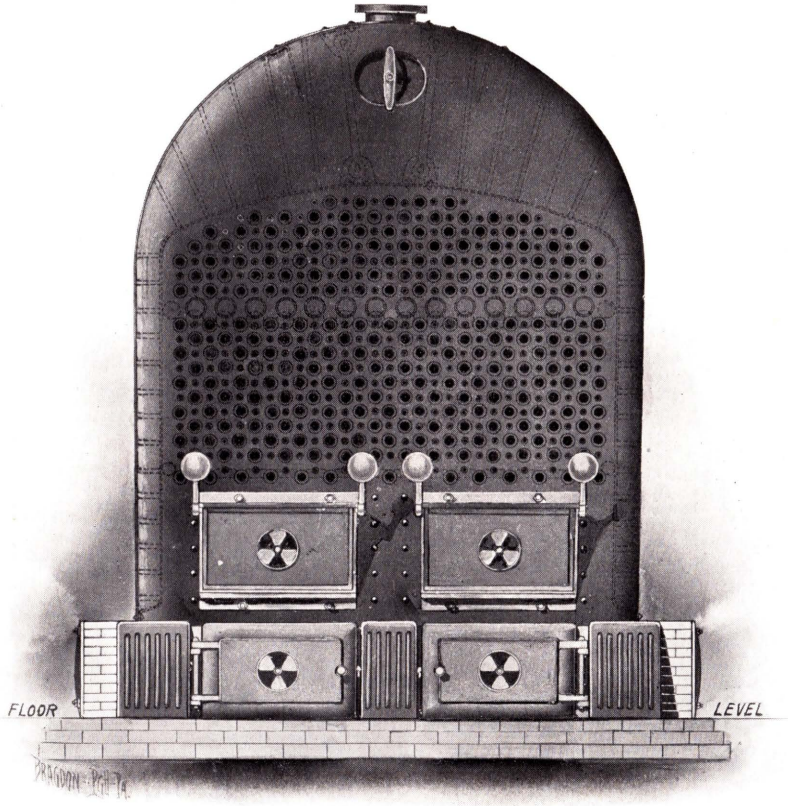


FIG. 16

FRONT VIEW CLASS B BOILER

Set on foundation.

Specifications for Tonkin Patent Internally-Fired Water Tube Boilers

Number of boiler	100	150	200	250	300
Horse-power	100	150	200	250	300
Total length of boiler (Class A or B)	15′ 6″	15′ 6″	15′ 6″	15′ 6″	15′ 6″
Height of boiler (Class A)	7′ 2″	7′ 6″	8′ 3″	9′ 0″	9′ 10″
Height of boiler (Class B)	9′ 1″	9′ 5″	10′ 2″	10′ 11″	11′ 9″
Total height of boiler (Class A or B), including brick setting	11′ 1″	11′ 5″	12′ 2″	12′ 11″	13′ 9″
Distance from crown sheet to top of shell	2′ 10″	2′ 10″	2′ 10″	2′ 10″	2′ 10″
Width of boiler outside (Class A or B)	5′ 7″	7′ 8″	8′ 2″	8′ 8″	8′ 8″
Width of brick setting outside (Class A or B)	7′ 7″	9′ 8″	10′ 2″	10′ 8″	10′ 8″
Width of fire box (Class A or B)	4′ 9″	6′ 10″	7′ 4″	7′ 10″	7′ 10″
Diameter of tubes (Class A or B)	3″	3″	3″	3″	3″
Length of tubes (Class A or B)	14′ 0″	14′ 0″	14′ 0″	14′ 0″	14′ 0″
Number of tubes (Class A or B)	82	126	170	225	271
Thickness of inner shell (Class A or B)	13/32″	13/32″	13/32″	13/32″	13/32″
Thickness of outer shell (Class A or B)	43/100″	58/100″	62/100″	66/100″	66/100″
Thickness of tube sheets (Class A or B)	½″	½″	½″	½″	½″
Thickness of outer heads (Class A or B)	7/16″	7/16″	7/16″	7/16″	7/16″
Length of grates (Class A or B)	5′ 0″	5′ 0″	6′ 0″	7′ 0″	8′ 0″
Width of grates (Class A or B)	4′ 9″	6′ 10″	7′ 4″	7′ 10″	7′ 10″
Square feet of grate surface (Class A or B)	24	34	44	55	62½
Number of red brick (Class A)	3620	3900	4200	4500	4800
Number of red brick (Class B)	1400	1600	1750	1840	1840
Number of fire brick (Class A)	1200	1300	1450	1700	1900
Number of fire brick (Class B)	675	750	850	975	1075
Diameter of smoke flue (Class A or B)	28″	34″	39″	42″	46″
Shipping weight, with all fixtures and fittings except stack (Class A)	.....	.....	.....	.....	.....
Shipping weight, with all fixtures and fittings except stack (Class B)	.....	.....	.....	.....	.....

Present Prices (subject to change without notice) of the

TONKIN PATENT INTERNALLY-FIRED WATER TUBE BOILERS

Patented March 24, 1896; March 22, 1898

Prices are without stack, f. o. b. Oswego, N. Y., as follows:

Size	Class A Per Horse-power	Class B Per Horse-power
50 horse-power	$16.00	.....
75 " "	16.00	.....
100 " "	14.00	$15.00
150 " "	13.00	14.00
200 " "	12.00	12.50
250 " "	12.00	12.50
300 " "	12.00	12.50

Stacks will be furnished, including guy wire cable, at five cents per pound.

With Class A boilers full fronts of cast iron or steel (fire and ash doors in the same) are included.

With Class B boilers half fronts, in which are the ash doors, are included.

With Class A boilers four long boiler supports (special design to provide for contraction and expansion) are provided.

With Class B boilers four short boiler supports are provided, same design as for Class A.

See page 12 for what is furnished with each boiler.

List of Users of the Tonkin Patent Internally-Fired Water Tube Boilers

Jadoo Manufacturing Co., Eighth and Fairmount Avenues, Philadelphia, Pa.
One 25 horse-power, open bottom

Halahan & Ahearn, 109th Street and Eighth Avenue, New York
One 80 horse-power, open bottom

Bloomingdale Brothers, 59th Street and Third Avenue, New York
One 110 horse-power, open bottom

Monroe Building, 17 Vandewater Street, near Brooklyn Bridge
One 225 horse-power, open bottom

Catholic School, Union Hill, Jersey City, N. J.
Two 60 horse-power each, open bottom

Steeles Mills, Rockingham, N. C.
Three 150 horse-power each, open bottom

Teresa Maranda, Mexico City, Mexico
One 50 horse-power, open bottom
Two 100 horse-power each, locomotive type

Economy Steam Heat and Power Co., Scranton, Pa.
One 350 horse-power, locomotive type

The Pelham Mills, Pelham, S. C.
Two 215 horse-power each, open bottom

City Island Electric Light and Power Co., City Island, N. Y.
Two 125 horse-power each, locomotive type

Manhattan Beach Hotel and Land Co., Manhattan Beach, N. Y.
Four 250 horse-power each, open bottom

Jackson Farm Gas Company, Apollo, Pa.
One 100 horse-power, locomotive type

The Eaton, Cole & Burnham Company, Bridgeport, Conn.
One 350 horse-power, locomotive type

Oil Well Supply Company, Oswego, N. Y.
One 250 horse-power, open bottom

Oil Well Supply Company, Pittsburgh, Pa.
Two 250 horse-power each, open bottom
Two 300 horse-power each, open bottom

Oil Well Supply Company, Oil City, Pa.
Three 250 horse-power each, open bottom
Two 300 horse-power each, open bottom

National Tube Company, Continental Department, Pittsburgh, Pa.
One 200 horse-power, open bottom
Two 215 horse-power each, locomotive type
Four 350 horse-power each, locomotive type

Recommendations

MR. JOHN EATON, President, PITTSBURGH, PA., December 12, 1902.
Oil Well Supply Company, Water Street, City.

DEAR SIR—We have installed in this plant seven Tonkin boilers, which have been in use for over four years, and I find them to be excellent for steam, having obtained 450 horse-power from those rated at 350 horse-power. They are also very economical in the use of fuel.

As for repairs, we have not required the services of a boiler maker for over a year. They have given us the best of results and I can cheerfully recommend them.

Yours truly,
(Signed) H. R. GILBERT, Manager,
National Tube Company, Continental Department.

OIL WELL SUPPLY COMPANY, MEXICO CITY, MEXICO, July 21, 1902.
Boiler Works Department, Oswego, N. Y., U. S. A.

MY DEAR SIRS—Although the bathing establishment has passed under other management about a year ago, it is only just to state that the boiler you shipped some years ago has so far given the best results, doing excellent service in the establishment.

(Signed) J. R. CARREL,
for Estate of Señor Don Jose de Teresa Miranda.

OIL WELL SUPPLY COMPANY, Oswego, N. Y. ROCKINGHAM, N. C., July 14, 1902.

GENTLEMEN—Replying to yours of the 10th inst., will say that we have had two of your boilers in continuous use for about three years, a part of the time night and day. The writer can't recall one minute's time lost, or a moment's uneasiness caused by them. Their work is perfect.

Very truly yours,
(Signed) W. B. COLE, Superintendent,
Steele's Mills.

(Since above was written an additional boiler has been ordered and installed).

PELHAM, S. C., July 14, 1902.

OIL WELL SUPPLY COMPANY, Oswego, N. Y.

DEAR SIRS—I have your favor of the 10th inst., and note contents. We have had in use two of the Tonkin boilers for several years, and find them perfectly satisfactory in every respect.

Yours truly,

ARTHUR BARNWELL, President,
The Pelham Mills.

J. J. TONKIN, M. E., Manager,
Boiler Works Department,
Oil Well Supply Company, Oswego, N. Y.

NEW YORK, September 24, 1902.

DEAR SIR—The 225 horse-power Tonkin Patent Water Tube Boiler which was installed by you in this place has given excellent satisfaction, and we are now talking the matter over of placing an order with your company for another Tonkin of the same capacity.

Yours truly,

(Signed) W. M. LOGAN, Chief Engineer,
for GEO. W. MUNRO.

Certificate of Inspection of Boiler No._____

Manufactured by the

OIL WELL SUPPLY COMPANY, PITTSBURGH, PA.

At the Boiler Works Department, Oswego, N. Y.

OSWEGO, N. Y._____190

This is to certify that Tonkin Patent Internally-fired Water Tube Boiler No._____ Class_____type, has been tested five times: twice by hydrostatic pressure of_____pounds per square inch, before the tubes were put in; once by hydrostatic pressure of_____pounds per square inch, after the tubes were set, and twice by steam pressure of_____pounds per square inch (a fire having been built in the boiler for the purpose). The second steam test was made after the boiler had cooled from the first.

We certify that the boiler is tight and in perfect condition, and that it was built in strict accordance with specifications furnished by the company, and was under constant inspection, both as to material and workmanship, during its construction.

OIL WELL SUPPLY COMPANY

_____

Foreman

_____

Chief Inspector

The above is the form of certificate furnished with each boiler.

The following evaporative tests were made by George Shaw, M. E., on a 200 horse-power open-bottom Tonkin Patent Boiler, at Continental Department of the National Tube Company, Pittsburgh, Pa., May 10th and 11th, 1900. These tests were made with the regular fireman in charge, and under the same conditions that existed daily, the boiler furnishing its regular quota of steam for the plant. Coal used was from the fourth pool, Monongahela Valley, an ordinary grade of bituminous coal.

MAY 10th

Duration of test	8 hours
Grate surface	38.25 square feet
Water pumped into boiler and apparently evaporated	64,123 pounds
Water actually evaporated, corrected for quality of steam	63,161 pounds
Amount of coal fired	8,100 pounds
Amount of ash	844 pounds
Per cent. of ash	10.4
Amount of combustible	7,256 pounds
Draft in stack	.85 of 1″
Draft in rear of boiler	.65 of 1″
Draft through furnace, ash pit doors open	.18 of 1″
Draft through furnace, ash pit doors closed	.35 of 1″
Temperature of escaping gases	407° F.
Temperature of feed water	60° F.
Temperature of boiler room	82° F.
Temperature of external air	55° F.
Average steam pressure	106 pounds
Factor of evaporation	1.1992

Water evaporated per pound of coal, actual conditions	7.797 pounds
Water evaporated per pound of coal from and at 212° F.	9.350 pounds
Water evaporated per pound of combustible	8.704 pounds
Water evaporated per pound of combustible from and at 212° F.	10.437 pounds
Horse-power of boiler, builders' rating	200
Horse-power developed	274.40
Per cent. above rating	36.85
Quality of steam	98.5%
Amount of moisture in steam	1.5%
Coal burned per square feet of grate surface per hour	26.47 pounds

MAY 11th

Duration of test	8 hours
Grate surface	38.25 square feet
Water pumped into boiler and apparently evaporated	61,791 pounds
Water actually evaporated, corrected for quality of steam	60,868 pounds
Amount of coal fired	7,250 pounds
Amount of ash	828 pounds
Per cent. of ash	11.4
Amount of combustible	6,422 pounds
Draft in stack	.72 of 1″
Draft in rear of boiler	.6 of 1″
Draft through furnace, ash pit doors open	.15 of 1″
Draft through furnace, ash pit doors closed	.32 of 1″
Temperature of escaping gases	449° F.
Temperature of feed water	60° F.
Temperature of boiler room	83° F.
Temperature of external air	59° F.

Average steam pressure	105 pounds
Factor of evaporation	1.199
Water evaporated per pound of coal, actual conditions	8.395 pounds
Water evaporated per pound of coal from and at 212° F.	10.065 pounds
Water evaporated per pound of combustible	9.322 pounds
Water evaporated per pound of combustible from and at 212° F.	11.177 pounds
Horse-power of boiler, builders' rating	200
Horse-power developed	264.4
Per cent. above rating	32.2
Quality of the steam	98.5%
Amount of moisture in steam	1.5%
Coal burned per square feet of grate surface per hour	23.69 pounds

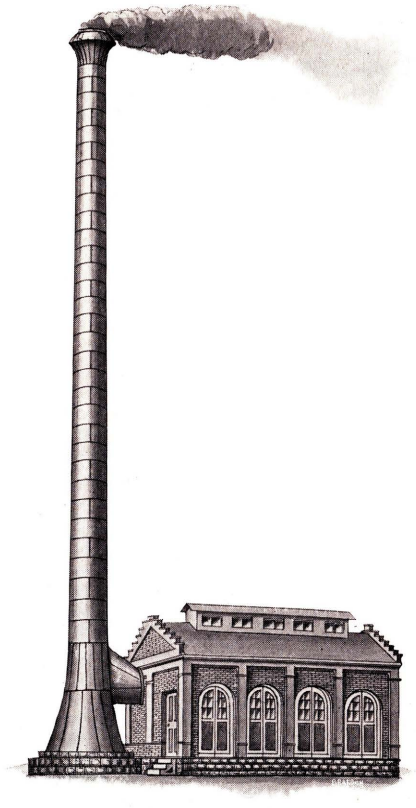


FIG. 25

Self-Supporting Steel-Plate Chimneys

For Blast Furnaces, Rolling Mills and Factories

Made of open-hearth steel, which has a tensile strength of 65,000 to 70,000 pounds, and an elongation of 25 per cent. in 8 inches.

Steel-plate chimneys have been used many years. Not one has been blown down. They withstand wind pressures that would wreck brick chimneys. Made of steel boiler plate, ranging in thickness from ½ inch at the bottom to $\frac{3}{16}$ inch at the top, are very durable and are being generally adopted everywhere for large steam plants. A permanent ladder makes it convenient to paint them. Painting every third year prevents rust. They are a protection against lightning. Their cost is about one-half that of brick chimneys, which they are rapidly superseding. Any diameter or height. Competent men sent to erect them, or we will contract to erect complete in any locality.

Table Giving Horse-Power and Sizes of Self-Supporting Steel-Plate Chimneys Furnished by Us

FULL BRICK LINED					NOT LINED				
Horse-power	Diameter in Clear Inches	Height in Feet	Diam. of Foundation Feet	Depth of Foundation Feet	Horse-power	Diameter in Clear Inches	Height in Feet	Diam. of Foundation Feet	Depth of Foundation Feet
200	36	80	12	6	200	36	80	12	6
225		100	14	7	225		100	14	7
250	40	95	14	7	250	40	95	14	7
300		125	17	7½	300		125	17	7½
350	44	115	18	7½	350	44	115	18	7½
400		135	18	7½	400		135	18	7½
450	48	125	18	7½	450	48	125	18	7½
500		150	19	8	500		150	19	8
550	56	115	18	7½	550	56	115	18	7½
600		135	19	8	600		135	19	8
650	60	115	18	9	650	60	115	18	9
700		135	19	9	700		135	19	9
750	66	110	19	9	750	66	110	19	9
850		125	20	8	850		125	20	8
1000		125	20	8	1000		125	20	8
1200	72	175	24	9	1200	72	175	24	9
1400		225	26	11	1400		225	26	11
1650	76	250	29	12	1650	76	250	29	12
1825	82	250	30	12	1825	82	250	30	12
2000	88	225	30	12	2000	88	225	30	12
2250	94	225	29	12	2250	94	225	29	12
2550		275	33	12	2550		275	33	12
2850		200	28	12	2850		200	28	12
3050	108	225	30	12	3050	108	225	30	12
3450		275	34	13	3450		275	34	13
3625		300	36	13	3625		300	36	13
4000	120	250	32	14	4000	120	250	32	14
4450		300	36	14	4450		300	36	14
4825	132	250	32	14	4825	132	250	32	14
5100		275	34	14	5100		275	34	14
5400	132	300	36	14	5400	132	300	36	14

Chasmar-Winchell New York and Pittsburg